



# **Olive Mill Wastes treatment in Israel Past, Present & Future**

**T. Aboud**

**Agro-ecology department, Ministry of  
Environmental Protection ,Israel.**

# **Situation Oct. 2017**

- 1. About 130 Olive mills in Israel**
- 2. 90 of them exist in the Northern District – Galilee region**
- 3. 110 OM are 3-phase producing :  
About 40,000-70,000 m<sup>3</sup>/year of OMW  
About 15,000-25,000 m<sup>3</sup>/year of OMSW  
(Depending on the season)**
- 4. 20 OM are two-phase producing :  
About 12,000-16,000 m<sup>3</sup>/year of Wet Husk**

# **OMSW**

**It is a minor problem.**

**We have problems on storing it and not on consuming it**

**Managements – consuming :**

- **For wood stove (chimney)**
- **Holding the plastic cover of a silage pit**
- **Livestock (calf) feeding after seed removal**
- **Direct Land application as nutrients**
- **Composting with livestock manure**



**Storing during the  
harvest**

**Liquid waste  
from rain and  
omsw**





# Some OM built a covered yard for OMSW





# Cylinders made from OMSW for chimney



**OMW**

**-**

**It is the major  
problem**

# **OMW disposal history**

**At the beginning - Before 1996 :  
All OM flowed their OMW to streams and  
environment.**

**By starting legal proceedings, they started to flow  
their OMW into the public sewage network**

**What happened ?????**

**OMW is a very very hard wastewater.**



# Average load from an average OM compared to Capita load

<b>Param.</b>	<b>Daily Capita load Avg. 50 kg [kg/day]</b>	<b>Daily load from avg. OM [kg/day]</b>	<b>Ratio OMW/ Capita</b>
<b>COD</b>	<b>0.15</b>	<b>3000</b>	<b>20,000</b>
<b>BOD<sub>5</sub></b>	<b>0.065</b>	<b>1300</b>	<b>20,000</b>
<b>N</b>	<b>0.01</b>	<b>20</b>	<b>2,000</b>
<b>P</b>	<b>0.001</b>	<b>8</b>	<b>8,000</b>
<b>K</b>	<b>0.0035</b>	<b>96</b>	<b>27,500</b>
<b>TS</b>	<b>0.165</b>	<b>1600</b>	<b>9,700</b>

# **What happened ?**

**1. Pipe sealing : results in flow of raw sewage of a neighborhood or a village/City into public roads and streams**

**2. Collapse of pumping stations results in flow of raw sewage of villages/cities into streams and rivers**

**3. Collapse of WWTPs , results in flow of untreated sewage of villages and cities into streams, rivers and seashores**

# **Karmiel WWTP collapse : 800,000 m<sup>3</sup> of nearly raw sewage flow to the Na'aman river**





**And then to the Mediterranean sea near  
Acre seashore and painted it BLACK**





**G'at WWTP collapse : 72,000 m<sup>3</sup> of raw sewage flow to Yanuh river**





# **Hosen Pumping station collapse : raw sewage to Achziv river**

**25 million m3  
of drinking  
water  
polluted and  
disqualified  
for use since  
2006 till 2016**





# Horfesh Pumping station collapse : raw sewage to Khabis river



## **Environmental Harms**

- 1. 3,000,000 m<sup>3</sup>/year of un-treated sewage flows to the Environment (ground water, rivers & sea) and causes catastrophic pollution**
- 2. Loss of 3,000,000 m<sup>3</sup>/year of treated wastewater for irrigation**

## **Economical harms**

- 1. 2,000,000 €/year for desalination of 3,000,000 m<sup>3</sup>**
- 2. 1,000,000 €/year for capacitive electricity and chemicals to try to avoid WWTP collapse and pumping stations repair and maintenance**

# **Dangerous Conclusion**

- **The Ecological harms of flowing OMW to the sewage network is harmful than directly to the environment ??????!!!!**



## **Trying to solve the problem ?!**

### **Land application on olive orchards :**

- 1. We organized study days for OM owner's to explain for them the benefits of controlled land application.**
- 2. Slow progress occurred, mostly because of :**
  - conservative mentality,**
  - logistic considerations**
  - topographic limitations**
  - meteorological conditions**
  - reservoir facilities**
  - high transportation costs,**

**3. We allowed spreading on agricultural roads which is preferred by the OM and land owners**

**4. In spite of that, they flow at nights their OMW into the public sewage network.**

**Because it is ZERO cost**

# OMW Spreading on agricultural roads





# OMW Spreading in olive orchards





# Dust prevention



## **2. Evaporation pond .**

**We built an evaporation pond especially for OMW collection during the olive harvest, that included a fat separator in order to improve evaporation.**

**The leftover – spreading in the summer  
OM owners got it free**

**But .....**

**After three years it become a stinking and unbearable odours source.**

**We destroyed it after 3 years**



# Evaporation pond in Mgar



***It does not exist yet***



**3. We tried Composting - is very costly because of transportation distances and relatively high gate fees, reservoir facilities.**

**4. We tried Flocculation systems : Chemicals based treatment is prohibitively costly, problematic maintenance, not user friendly, low removal ~ 35%**

**5. We have a Bio-gas reactor for livestock manure, that can take limited quantity because of Polyphenols (Max. 10% which is 35 m<sup>3</sup>/day) , far and high gate fees**

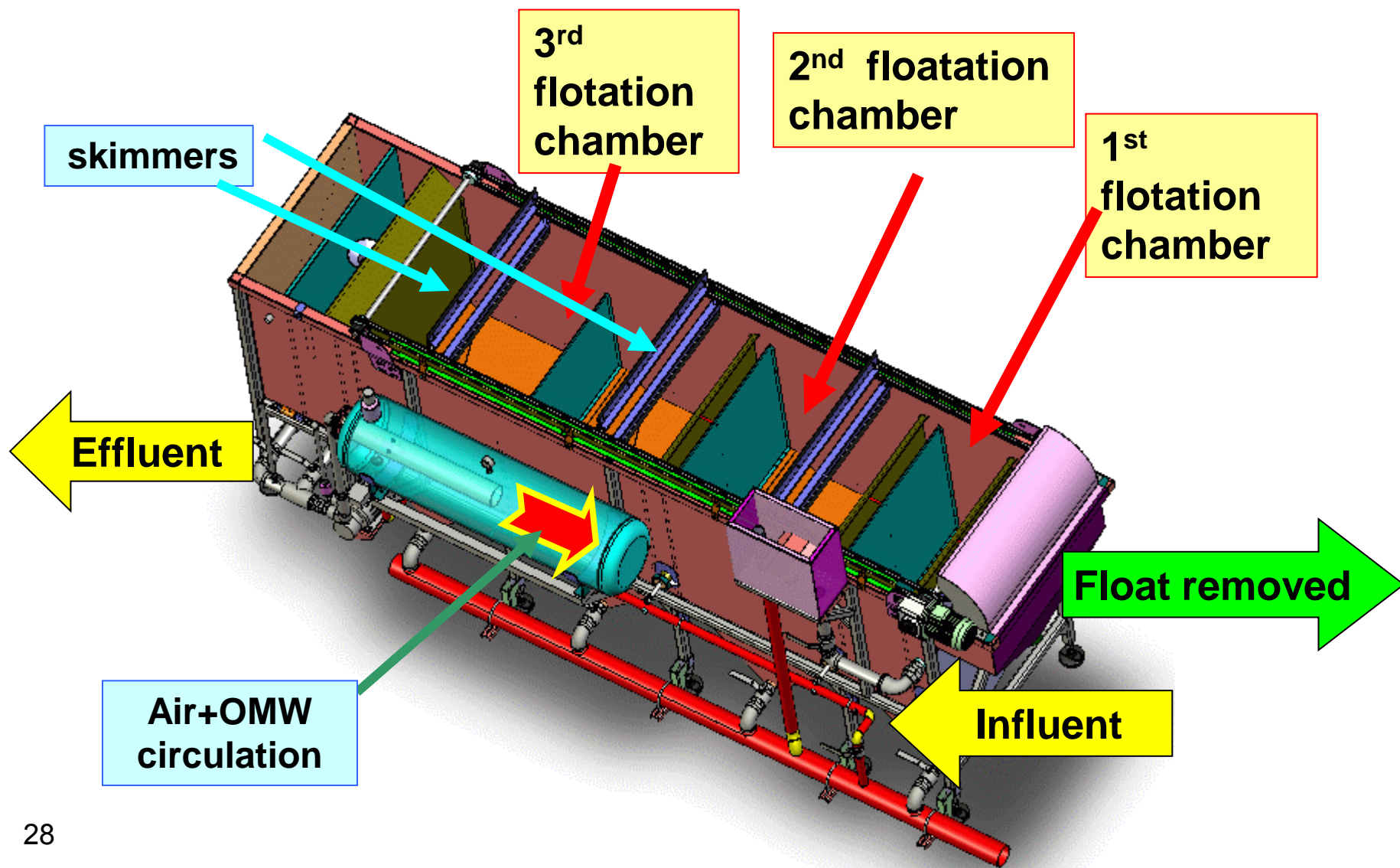


**6. We implemented 10 unique DAF systems on Cabri & ziv aquifer Oms, especially designed for OMW treatment to achieve at least 70% reduction, where our main goals were to prevent :**

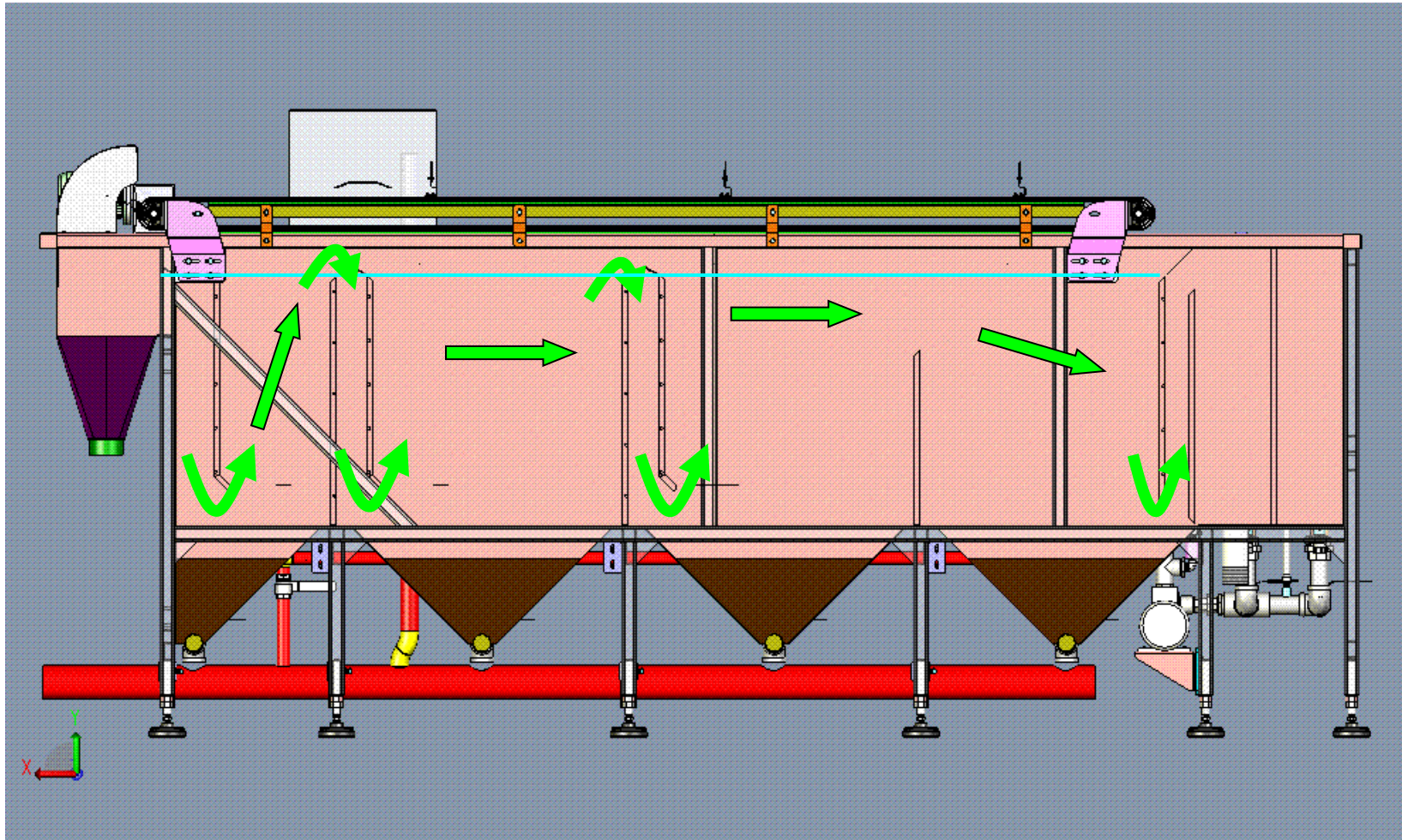
- a) Collapse of the piping systems,**
- b) Collapse of the pumping stations**
- c) Collapse of the WWTPs**
- d) Pollution of Cabri & Ziv springs**



# Z-Qlean DAF



**Main features : 3 chambers – long path - long time increases the probability of the bubble adhering to suspended particle.**





# Z-Qlean DAF



## **Situatuon of 2008-2017**

**Up to 70% reduction in COD, BOD, TSS & Fats**

**Unfortunately, the laws changed in 2010 and forced all industrial plants including OM to stand with maximum values .**

**For example : MAX. COD 2000 mg/l.**

**At the same time, WWTP transferred from Extensive to Intensive process with tertiary treatment and become more sensitive to fluctuations in organic loads and they have to stand with the new irrigation values ruled by the new law.**

## **Situatuon 2017**

- **All 9 DAF are out of use**
- **We still hold one, where the WWTP can accept.**
- **Next year it will be also out of use because of law stands.**



## **7. Integrated solution with WWTP**

**On 2011 season we promoted a more feasible approach, which based on :**

- 1. Collection of OMW from 15 OM in 10 km radius during the olive harvest in an existing not used sealed pond – near Arabe village in the Galilee.**
- 2. Then feeding the OMW to the WWTP in a controlled flow rate during the whole year – till the next harvest - without harming the treatment process in the WWTP.**

## **Results :**

- 1. OM owners preferred this solution**
- 2. Cost less than spreading**
- 3. No logistic, topographic, meteorological limitations.**

## **Conclusion**

**It is a feasible controlled solution to prevent catastrophic pollution from OMW .**

## **unfortunately**

**In 2016 it became a solid waste “station” and it is out of use**

# Arabe Pond





**So, Our Conclusion, the best available disposal is land application/ Spreading.**

**But,**

**Land application cost ~ 10-18 € / m<sup>3</sup>**

**And,**

**To sewage network = ZERO €**

**To Avoid :**

**We need for every OM an inspector 24/7**

## **OMW disposal 2017**

- **Our ministry and the water authority decided to subsidize the spreading operation by 35 NIS~9€ / m<sup>3</sup>**
- **The operational mechanism done by the water & wastewater corporations.**
- **The corporations also decided to subsidize so that the OM owner will pay just 15 NIS~3.5 € / m<sup>3</sup>**

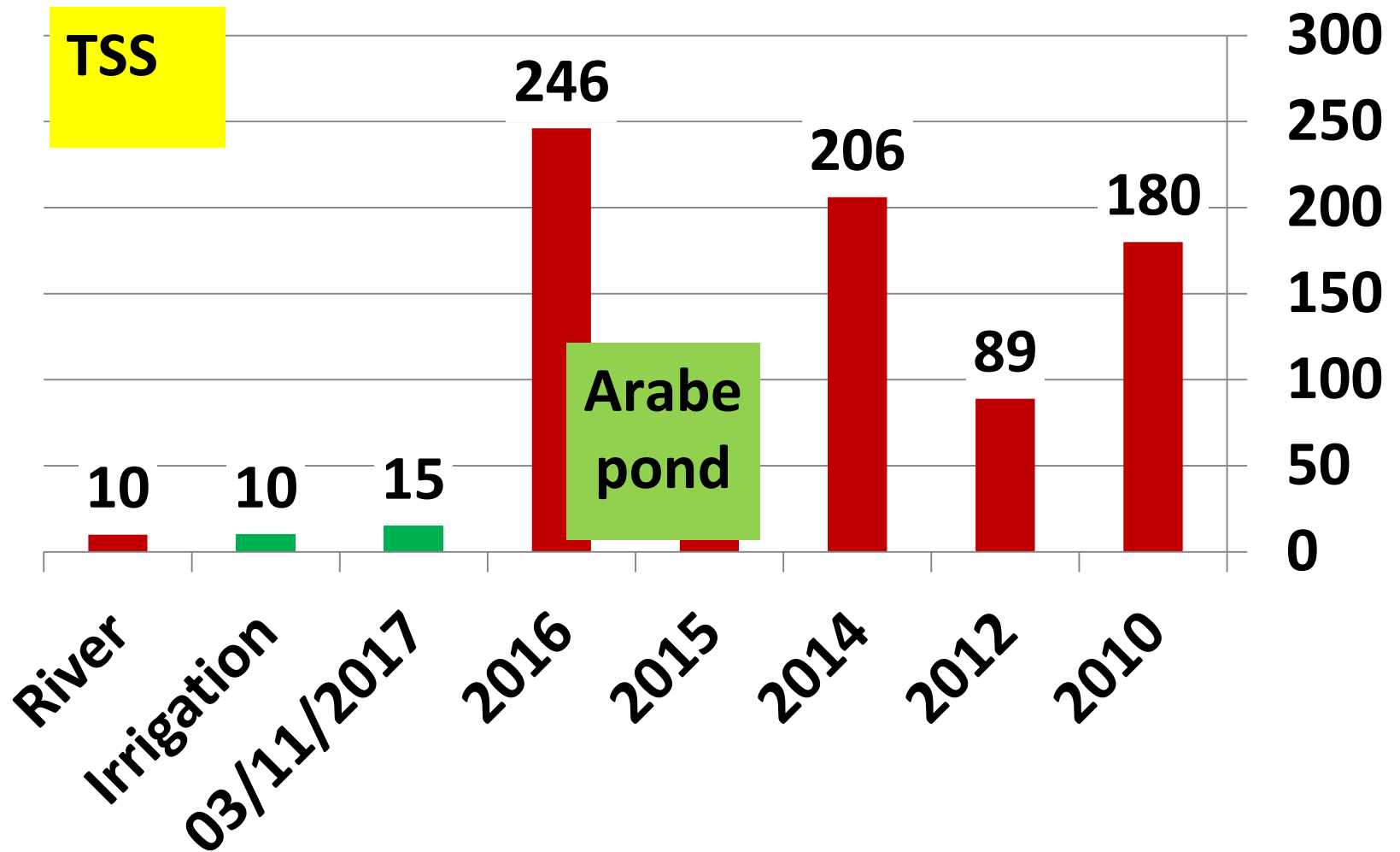
**Most of the OM owners agreed for this deal.**

# Advantages of this mechanism

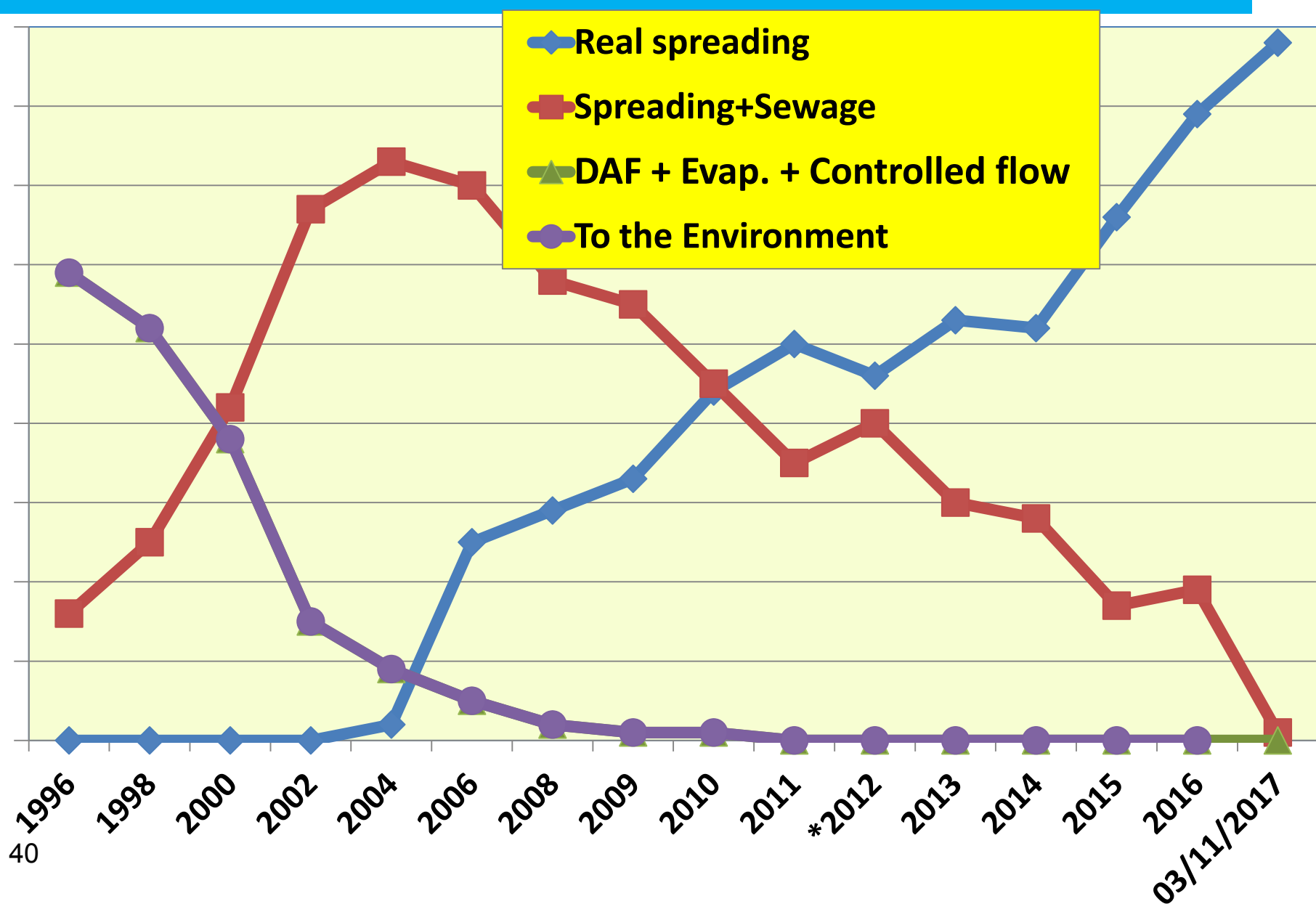
- **Daily registration of OMW volume pumped.**
- **Weakly reading of water meter.**
- **Weekly equalization between the two quantities**
- **Obligation by the water bill**
- **Efficient inspection on spreading**



# Karmiel WWTP



# OMW disposal –1996-2017 - North District



## **2-Phase OM**

**We thought that 2-phase is better than 3-phase –  
No OMW.**

**It seems NO :**

- **In addition to the OMW limitations  
conservative mentality, logistic topographic  
meteorological**
- **High gate fees and transportation costs for  
composting facilities.**
- **Higher reservoir volumes**
- **Higher cost and special facilities for land  
application**



## 2-Phase Husk





## 2-Phase Husk





## 2-Phase Husk





## 2-Phase Husk





## 2-Phase Husk



**In parallel to give solutions we practice  
Enforcement and legal proceedings**

**On 2011-2016 : 12 criminal records  
submitted to the court of justice.**

**It is very difficult to “catch” of flowing  
OMW to the sewage network because as  
said they can do it after midnight**



# **Legislation & Regulations**

## **1. Business license terms**

**Infrastructure and operating conditions**

## **2. Water and sewage corporations rules**

### **Section B: Olive mills**

- **Request for OMW storing container**
- **Mnimum capacity : full 3 working days calculated on basis of maximum machine rate production.**

# **Legislation & Regulations**

## **3. Rules for corporations of water and sewage (factory sewage that flows into the sewage system) – 2014)**

- **Contains the maximum concentrations allowed to flow to the sewage system.**
- **The law includes fines for deviations.**
- **Monitoring program**

# **Legislation & Regulations**

## **4. Water law**

- **Prevention of water pollution in all water installations (rivers, runoff, ground water & sewage system)**
- **Relatively high fines.**

## **5. Cleanless Law**

- **On-line fine giving for throwing all kind of wastes (solid/liquid) to the environment**

# **Our Policy for the short-term future**

**Continuing with land application but not depending on the OM owners, depending on the water and wastewater corporations**

## **Next year ????????**

- **Money subsidize for spreading - we will success - again depending on meteorological conditions,.**
- **No subsidize - we will fail.**



# **Policy for the long-term future**

- 1. Because of the short time season of the olive harvest and the small quantity of OM wastes produced in Israel, we believe that OM wastes should be integrated with other agriculture wastes produced during the year.**
- 2. We believe that the sustainable environmental-economical treatment for all the organic agricultural wastes including OM wastes should be based on produce energy and then giving back the nutrients to the land - Bio-gas equivalent processes .**

**3. It should not be based on energy consumed processes in order to treat these rich-energy wastes.**

**4. It is a high initial costs but economic for the long-term future**

**5. In parallel – not before - Gradual transformation to a two-phase process**

**6. It could be regional and CROSS-board facilities**

**Thanks for listening**

**What our experts  
suggest & advise ?**